

OHIO STATE LAW JOURNAL

Volume 66, Number 3, 2005

A Transaction Costs Theory of Patent Law

PAUL J. HEALD*

Patent law is under-theorized in the sense that the predominating incentive-based justifications cannot by themselves adequately explain empirical evidence on patenting gathered by research economists. This article provides an alternative justification for patent law based on private transaction costs savings offered by patent law in comparison to alternative options available to those who wish to exploit information assets. In particular, it identifies striking parallels to corporate law as described in recent scholarship and shows how patents act as affirmative asset partitions and how they ameliorate significant team production problems. Even if the patent system provides no significant incentives to invent, it can be explained and justified in terms of transaction costs savings.

I. INTRODUCTION

Patent law needs a theoretical justification that better fits existing empirical data on inventive activity, innovation, and the commercialization of new products. Currently, incentive theories predominate: these theories assert that the prospect of earning super-competitive profits provides necessary incentives for invention,¹ innovation,² and disclosure.³ The reward of exclusive rights, it is assumed, will spur

*Allen Post Professor of Law, University of Georgia. I would like to thank Margaret Blair, John Duffy, Scott Kieff, Mark Lemley, Doug Lichtman, Clarisa Long, Rob Merges, Chuck O'Kelley, Robert Thompson, John L. Turner, Sam Vermont, Christopher Yoo, and participants at the 2003 IP Scholars conference at Tulane Law School, the Georgetown University Law Center IP Colloquium, and the English IP Teachers Conference at the University of Western England, Bristol.

¹ Courts and commentators frequently describe patent law as providing incentives for inventors to create. For some of the many discussions of the incentive-to-invent rationale, see WARD BOWMAN, PATENT AND ANTITRUST LAW 2-3 (1973); *Diamond v. Chakrabarty*, 447 U.S. 303, 307 (1980) (noting that patent law offers "inventors exclusive rights for a limited period as an incentive for their inventiveness and research efforts" (citing *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480-81 (1974))). A recent search of the Westlaw JLR database for "incentive /s invent! /s patent" returned 905 documents.

² The incentive-to-innovate rationale focuses on the need to recover the costs necessary to bring an invention to market. See, e.g., F.M. SCHERER, INNOVATION AND GROWTH: SCHUMPETERIAN PERSPECTIVE (1984); F.M. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE (2d ed. 1980); F. Scott Kieff, *Property Rights and Property Rules for*

creativity, productivity, and the dissemination of information. If the foregoing benefits outweigh the costs of granting exclusive rights,⁴ then patent law would be justified in the economic sense. As one influential commentator succinctly notes, the incentive story has been “the model for 200 years.”⁵

Empirical data suggests, however, that the incentive model provides at best a partial justification for the patent system. A comprehensive Brookings Institute study of published data on patenting recently concluded: “Taken as a whole, the empirical literature is inconclusive on the question of whether stronger patents increase *or* decrease innovation.”⁶ The literature canvassed in the Brookings study, along with other influential and frequently cited studies,⁷ supports weak, strong, and inconclusive correlations between patent scope and expenditures on research and development.⁸ The incentive story is further undermined by the growing consensus that very few patents confer market power on their owners,⁹ a conclusion that undermines both the cost and benefit sides of the economic analysis of patents. Weak market power means weaker incentive benefits, but it also means that the public costs of patenting may have been exaggerated. Finally, new patent pricing models reveal

Commercializing Inventions, 85 MINN. L. REV. 697, 703–04 (2001); Rebecca Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1036–37 (1989) (“The protection of a patent monopoly enhances the likelihood that a firm will be willing to undertake [innovation.]”); Canada–Patent Protection of Pharmaceutical Products, Doc. WT/DS114/R (WTO Dispute Settlement Panel, March 17, 2000) (“Patent laws establish a carefully defined period of market exclusivity as an inducement to innovation”); *see also* Julie S. Turner, Comment, *The Nonmanufacturing Infringer: Toward a Theory of Efficient Infringement*, 86 CAL. L. REV. 179, 192 (1998) (“A comparison of the incentive-to-invent and the incentive-to-innovate theories shows the waning of the former and the waxing of the latter.”).

³ In order to receive a patent, inventors must fully disclose their invention to the public. *See* 35 U.S.C. § 112 (2000) (requiring a patent application to provide a written description that would enable someone skilled in the relevant art to practice the invention). *See, e.g.*, 3 JOSEPH STORY, COMMENTARIES ON THE CONSTITUTION OF THE UNITED STATES § 1147 (1833) (“In short, the only boon, which could be offered to inventors to disclose the secrets of their discoveries, would be the exclusive right and profit of them, as a monopoly for a limited period.”).

⁴ Some patents may allow owners to charge higher prices, restrict output, or stifle beneficial follow-on innovation. *See* RICHARD A. POSNER & WILLIAM LANDES, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 57 (2003).

⁵ Mark A. Lemley, *Reconceiving Patents in the Age of Venture Capital*, 4 J. SMALL & EMERGING BUS. L. 137, 139 (2000). *See* ROBERT W. HAHN, AEI-BROOKINGS JOINT CENTER FOR REGULATORY STUDIES, *THE ECONOMICS OF PATENT PROTECTION: POLICY IMPLICATIONS FROM THE LITERATURE* 4 (2003) (“In general, classical theory supports a positive view—that patents, while exacting a price from society, provide incentives to innovate.”).

⁶ HAHN, *supra* note 5, at 2.

⁷ *See infra* notes 125–30 and accompanying text.

⁸ *See* HAHN, *supra* note 5, at 2.

⁹ *See infra* notes 132–35 and accompanying text.

the difficulty R&D managers have had in making ex ante valuations of patents¹⁰ and therefore support studies finding that decision makers often do not rely on patents in appropriating returns on anticipated investments.¹¹ Although intuition tells us that the prospect of acquiring exclusive rights must surely encourage research and development, scholars have begun to suspect that the “incentive story as classically told has some serious problems.”¹²

In other words, the incentive theory incompletely justifies the patent system. Recently, scholars have begun work on the project of constructing non-incentive models to justify the granting of patents. Clarisa Long, for example, argues that firms patent in order to signal information to markets.¹³ For her, the patent system, wholly apart from any invention or innovation it may induce, serves the important function of lowering information costs to firms.¹⁴ It provides a firm with a convincing means of signaling to capital markets the strength of its R & D capacity and human capital, and of attracting licensing opportunities. Other scholars, working roughly in what might be called the New Institutional Economics,¹⁵ have emphasized how patents enable trading in information assets, stimulating a thicker market in technological information.¹⁶ Additionally, the early work of Edmund Kitch goes beyond incentive theories by emphasizing the public cost savings of early patent grants.¹⁷ This paper

¹⁰ See Russell F.R. Denton & Paul J. Heald, *Random Walks, Non-Cooperative Games, and the Complex Mathematics of Patent Pricing*, 55 RUTGERS L. REV. 1175 (2004) (asserting novel adaptation of Black-Scholes equation provides first accurate metric for patent pricing).

¹¹ See *infra* note 136 and accompanying text.

¹² See Lemley, *supra* note 5, at 148. See also Gideon Parchomovsky & Peter Seigleman, *Toward an Integrated Theory of Intellectual Property*, 88 VA. L. REV. 1455, 1457 (2002) (“[T]here exists a striking misfit between the academic theory of intellectual property and its use in the real world.”).

¹³ See Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 626–27 (2002).

¹⁴ *Id.* at 627.

¹⁵ Robert Merges, *Intellectual Property Rights and the New Institutional Economics*, 53 VAND. L. REV. 1857, 1877 (2000) (“Property rights, firms, institutions, governments: all of these are the subject of extensive study by social scientists operating within the NIE [New Institutional Economics] framework. It is time to integrate the study of IPRs into this framework.”).

¹⁶ See Nancy T. Gallini and Ralph A. Winter, *Licensing in the Theory of Innovation*, 16 RAND J. ECON. 237, 238 (1985) (“[B]y protecting property rights, patents here open the market for trade in technological information”); James Anton & Dennis Yao, *Expropriation and Inventions: Appropriable Rents in the Absence of Property Rights*, 1 AM. ECON. REV., March 1994, at 190, 192 (analyzing how patents help solve Arrow’s information paradox, enabling independent inventors to negotiate with firms); Robert Merges, *Expanding Boundaries of the Law: Intellectual Property and the Cost of Commercial Exchange*, 93 MICH. L. REV. 1570, 1590–91 (1995) (discussing how intellectual property rights lower transaction costs).

¹⁷ See Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977). Kitch assumes that patents will generate both rent seeking and innovation, so he has one foot firmly in the incentive theory tradition, but his focus on how the patent registration system

builds on existing non-incentive theories and proposes a powerful justification for patent law based on private transaction costs savings. Given ambiguous empirical support for the long-held incentive theory, the transaction costs theory and complementary non-incentive theories provide an adequate economic justification for patent law. Furthermore, even if empirical evidence were to show that the costs of patenting and the value of stimulated innovation offset each other, the transaction costs theory suggests that the patent registration system should nonetheless be maintained as providing a net economic benefit.

In particular, patent law serves to lower transaction costs in ways previously unidentified in the theoretical literature. By establishing a title registration system for some sorts of information assets, patent ownership rules significantly reduce transaction costs compared to the available alternative systems for protection: trade secrecy and contract law. Instead of filing for a patent and complying with federal disclosure requirements, a firm could choose instead to exploit information secretly by taking physical precautions and binding employees, managers, licensees, potential licensees, sources of venture capital, and other information transferees through a complex web of contracts. Although previous commentators have noted some cost savings associated with patenting,¹⁸ recent scholarship in the area of corporate law has made possible the exposition of a more complete transaction costs rationale.

More specifically, theorists of the firm have long sought to explain the law of business organizations as providing legal structures as responses to situations where contractual solutions are likely to be too costly.¹⁹ Similarly, the patent form can be characterized as a legal structure designed to reduce costs associated with alternative regimes. Critical in this regard is recent groundbreaking work by corporate law scholars who have de-emphasized the role of limited shareholder liability and agency costs in the development of the corporate form. Instead, the new scholarship describes the corporation primarily as a superior response to (i) the need to shield the assets of an enterprise from the creditors and heirs of those who invest in it ("affirmative asset partitioning")²⁰ and (ii) the need to monitor shirking and opportunistic behavior when the relative value of inputs and outputs of an enterprise are difficult to measure ("team

deters costly duplicative races to innovate and facilitates some transactions between firms foreshadows more recent non-incentive theories.

¹⁸ See *id.* at 275–80.

¹⁹ See Benjamin Klein et al., *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J.L. & ECON. 297, 298 (1978) (discussing when the likely appropriation of quasi rents drives the vertical integration of the firm). Of course, the modern discussion of the role of transaction costs in firm structure begins with R.H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386 (1937).

²⁰ See Henry Hansmann & Rainier Kraakman, *The Essential Role of Organizational Law*, 110 YALE L. J. 387, 393–95 (2000).

production problems”).²¹ Critical features of patent law can be explained as robust responses to these two same concerns.

Part II of this essay describes how the patent form facilitates affirmative asset partitioning and ameliorates critical team production problems in contexts where trade secrecy or contractual solutions entail significantly higher transaction costs.²² Patent theory has much to learn from how the problem of transaction costs is addressed in the theory of the firm. Part III demonstrates the power of the transaction costs theory to explain prominent “patent paradoxes” identified in the empirical economic literature on patenting.²³ Popular incentive theories are inadequate to explain, for example, studies showing a low correlation between patenting rates and measures of R&D spending by patenting firms. Incentive theories also imperfectly explain high rates of patenting when the odds of a patent conferring market power are also very low.²⁴ The transaction costs theory is demonstrably more consistent with the body of seemingly contradictory empirical data that has been collected over the last twenty-five years. Part IV concludes by briefly noting the normative role of non-incentive theories. Even if economists can never convince policymakers that the incentives to create and innovate provided by patent law offset the costs imposed by the system,²⁵

²¹ See Margaret Blair & Lynn Stout, *A Team Production Theory of Corporate Law*, 85 VA. L. REV. 247, 249–51 (2001).

²² Connecting the law of business organizations to patent law may seem an unusual project, but its historical roots go back over 380 years to the English Parliament’s provision of monopoly exemptions for both inventors and publicly chartered companies in the Statute of Monopolies. See An Act Concerning Monopolies and Dispensations with Penal Laws, and the Forfeitures Thereof (Statute of Monopolies), 1623, 21 Jam. 1, 3 (Eng.) (generally banning the Crown’s practice of granting monopolies, subject to several express exceptions). See also Malla Pollack, *Purveyance and Power, or Over-Priced Free Lunch: The Intellectual Property Clause as an Ally of the Takings Clause in the Public’s Control of Government*, 30 SW. U. L. REV. 1, 75–79 (2000). Neither innovation nor invention was required for exempted monopoly grants. The statute ended the abusive gifting by the Crown of monopolies to favored courtiers, but did not prevent grants to business entities like the Hudson Bay Company or the East India Company. See also KENNETH R. ANDREWS, *TRADE, PLUNDER AND SETTLEMENT: MARITIME ENTERPRISES AND THE GENESIS OF THE BRITISH EMPIRE, 1480–1630* (1984); *SELECT CHARTERS OF TRADING COMPANIES 1530–1707* (Cecil T. Carr ed. 1913). An incentive-to-invent or reward theory of patent law has difficulty explaining the stunning breadth of this exception.

²³ See *infra* notes 124–131 and accompanying text.

²⁴ See *infra* notes 132–39 and accompanying text.

²⁵ For the most famous statement of skepticism, see SENATE COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM: STUDY NO. 15 OF THE SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHTS 80 (Comm. Print 1958) (reporting Fritz Malchup’s study).

If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it. . . .

the transaction costs rationale can be offered as an independent justification for the system and one that may have serious implications for patent office reform.

II. CORPORATIONS AND PATENTS AS COST-REDUCING LEGAL FORMS

Business and corporate law present many different organizational options for firms and individuals. In the abstract, no single organizational form is the most attractive. Different commercial contexts and business exigencies drive a firm's rational choice to operate as a sole proprietorship, a general partnership, a limited partnership, a closely held corporation, or a publicly traded one. Likewise, commercial exigencies (wholly apart from dreams of market power) also drive most decisions whether to patent an invention. Clarisa Long, for example, suggests that reducing information costs provides one important explanation for the decision to patent.²⁶ Even if a firm has no intention to use or license an invention, it may still apply for a patent in order to signal the state of its R&D capacity, and the quality of its human capital to other firms or capital markets.²⁷ A close look at recent economic scholarship on the corporate form suggests another explanation for patenting that does not rely on a firm's prospects of obtaining market power—that the patent form reduces important sorts of transaction costs.

A. *The Corporate Form as Affirmative Asset Partition*

Although standard corporate law texts still emphasize almost exclusively the need for limited shareholder liability as the driving force behind the development of the corporate form,²⁸ recent commentary challenges the traditional story, and the lessons for patent law are profound. Corporate law scholars Hansmann and Kraakman take direct aim at the standard assertion that limited liability is what primarily drives the corporate form.²⁹ Although shielding shareholders from the claims of corporate creditors, “defensive asset partitioning,”³⁰ is admittedly relevant, it is of “distinctly secondary importance.”³¹ Instead, they suggest that “[t]he truly essential aspect of asset partitioning is, in effect, the reverse of limited liability—namely, the shielding of the assets of the entity from claims of the creditors of the

Id. “[Malchup’s] study remains authoritative.” Kitch, *supra* note 17, at 289 n.72.

²⁶ See Long, *supra* note 13, at 626.

²⁷ See *id.* at 627–28 (arguing that the patent system allows firms to “choose to obtain and use a portfolio of patent rights to signal information about themselves that would be more expensive to convey through other means”).

²⁸ See generally STEPHEN B. PRESSER, *PIERCING THE CORPORATE VEIL* (2001); Blair & Stout, *supra* note 21, at 247.

²⁹ Hansmann & Kraakman, *supra* note 20, at 390.

³⁰ *Id.* at 395–96.

³¹ *Id.* at 390.

entity's owners or managers."³² The value of the *affirmative* asset partition arguably best explains the flourishing of the corporate form.

Imagine a group of investors seeking to build and operate a railroad. As a partnership, their pool of assets remains constantly vulnerable to disruption. Heirs of a deceased partner would have the right to withdraw the partner's proportional share of the assets, and creditors of any partner might force liquidation of his or her assets in the partnership. A legal form that shields a business enterprise from such disruption would have distinct advantages in attracting capital and conducting the long-range planning necessary to construct something like a railroad.³³ Blair explores the history of affirmative asset partitioning and notes that the primary reason given by the Schuylkill Coal Company in its 1823 request to the Pennsylvania legislature for a corporate charter was to "have the real estate of the Company, consisting of the coal lands which they hold . . . exempted from the laws of succession or inheritance, which govern cases of natural persons or individuals."³⁴ Operating as a partnership would have left the company vulnerable in the event of the death or bankruptcy of a partner.

The advantage of affirmative asset partitioning through incorporation is clear: "if a shareholder becomes insolvent [or dies], the shareholder's personal creditors [or heirs] cannot force liquidation of corporate assets to satisfy their claims upon exhausting the shareholder's personal assets. Rather, a shareholder's creditors at most can step into the shareholder's role as an owner of shares"³⁵ Asset partitions can, in theory, be effected through contract law, but it is frequently too costly to negotiate *ex ante* agreements with all parties who might potentially make claims through each partner. The corporate form allows assets to be cheaply and easily placed beyond the reach of parties who could otherwise interfere with the development of the enterprise. As an essential part of the corporate form, the affirmative asset partition makes capital easier to attract, stabilizes enterprise operations, and facilitates long-term planning. The patent form provides similar advantages at a cost significantly lower than contractual and trade secrecy alternatives.

³² *Id.*

³³ See Margaret M. Blair, *Locking in Capital: What Corporate Law Achieved for Business Organizers in the Nineteenth Century*, 51 UCLA L. REV. 387, 397–98, 442 (2003).

³⁴ *Id.* at 420 (quoting MANUEL EYRE ET AL., REMARKS AND OBSERVATIONS SHOWING THE JUSTICE AND POLICY OF INCORPORATING "THE SCHUYLKILL COAL COMPANY" 1–8 (Philadelphia 1823)). See also Paul Mahoney, *Contract or Concession? An Essay on the History of Corporate Law*, 34 GA. L. REV. 873, 878–92 (2000) (exploring the historical roots of asset partitioning).

³⁵ See Hansmann & Kraakman, *supra* note 20, at 394 (noting also that obtaining shares "offers the power to seek liquidation only when at least a majority of the firm's shareholders agree").

B. *The Patent Form as Affirmative Asset Partition*

To see how affirmative asset partitioning works in the context of information assets, it helps to imagine a firm contemplating acquiring two distinct assets: an automobile and a secret chemical formula. The automobile is a relatively stable and risk-free investment. Its market price is easy to determine, and the local vehicle title registration system greatly reduces the possibility that a competing claimant to the auto will be able to prove post-transfer that it has superior title.³⁶ The firm should be relatively unconcerned, for example, about the creditors and heirs of the vehicle's former owners. The title registration system partitions the vehicle in functionally the same way as incorporation partitions a firm's assets from creditors and heirs of its owners.

When acquiring the chemical formula as a trade secret,³⁷ the firm would like to erect the same sort of partition from risk as is available with its motor vehicle assets. In the absence of a patent, it will be very costly to acquire and hold the formula free from outside interference. One problem stems from the fact that no one can record title to a trade secret.³⁸ The acquiring firm, therefore, will have difficulty determining whether the chemical formula can be legally transferred by the transferor.³⁹ The transferor may have stolen the formula from a third party or obtained it in violation of a duty of confidentiality. Determining the legal status of a trade secret is much more complicated and costly than simply checking a state's online database of vehicle registrations.

More importantly, even if the transferor of the secret has good "title," it remains difficult to effect a post-transfer partition. Even after the firm acquires the chemical formula, the transferor will almost certainly retain knowledge of it and therefore the

³⁶ The firm would do well, of course, to check the relevant public records to make sure that no one has taken the vehicle as collateral for a loan or filed a lien on it.

³⁷ See RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (1993) ("A trade secret is any information that can be used in the operation of a business or other enterprise and that is sufficiently valuable and secret to afford an actual or potential economic advantage over others.").

³⁸ See *id.* at §§ 39–44. Neither the federal government nor states maintain a title registry for trade secrets. The primary purpose of trade secret law is to provide augmented remedies for secrets that are misappropriated through otherwise tortious conduct or through the breach of an express or implied promise of confidentiality. See Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: The Intellectual Property Clause as an Absolute Constraint on Congress*, 2000 U. ILL. L. REV. 1119, 1194–95; Paul J. Heald & Michael L. Wells, *Remedies for the Misappropriation of Intellectual Property by State and Municipal Governments Before and After Seminole Tribe: The Eleventh Amendment and Other Immunity Doctrines*, 55 WASH. & LEE L. REV. 849, 859–60 (1998); Paul J. Heald, *Federal Intellectual Property Law and the Economics of Preemption*, 76 IOWA L. REV. 959, 976–80 (1991).

³⁹ See Edmund Kitch, *The Law and Economics of Rights in Valuable Information*, 9 J. LEGAL STUD. 683, 690 (1979) (discussing difficulty of detecting whether secret has been misappropriated).

ability unilaterally to reduce its value by using it, revealing it to competitors of the firm, or even publishing it.⁴⁰ Contracts can be written to deter opportunistic behavior by the transferor of a trade secret, but entering into protective agreements and policing them raises the cost of the transaction, especially if the transferor is unwilling to agree to draconian penalties for unauthorized post-transfer revelation.

The firm who acquires a trade secret as an asset should also have concerns about possible revelation through entities related to the transferor who have knowledge of the secret. These might include former employees of the transferor, its creditors,⁴¹ or firms that unsuccessfully negotiated with the transferor for acquisition of the same information. Anyone with knowledge of the secret retains the power to affect its value. Although the law will often imply a promise not to reveal the secret,⁴² identifying implied promises is onerous, as would be identifying and negotiating promises from those who do not owe a duty of confidentiality.⁴³ Erecting an affirmative asset partition by contract is clearly difficult and fraught with uncertainty. In fact, given that the law permits others to reverse engineer the secret or

⁴⁰ *Id.* at 709.

[I]nformation transactions are difficult. . . . [I]f the transaction involves information that can be protected only through secrecy, it will be difficult for [the buyer] to know whether the information is being provided to other firms. "Shhh!," the seller will wisely caution everyone. If that contingency cannot be monitored, however, the buyer will not know what to pay for the information.

Id.

⁴¹ Imagine a judgment lien creditor who properly levies on all the transferor's assets, including documents containing the chemical formula. An argument can be made that the levying creditor's commercial exploitation of the secret would be rightful. First, trade secret misappropriation generally only occurs when the secret is obtained via trespass or breach of an express or implied promise not to reveal it. *See* RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 40 (1993). The creditor's possession of the transferor's assets after the levy is legal, and he will have made no express promise to the licensee/transferee not to reveal the secret. One might argue that the creditor makes an implied promise not to exploit the information until after it is sold at auction, *see* U.C.C. § 9-504 (2001) (regulating form of post-repossession sale of collateral), or formally accepted by the creditor in full satisfaction of the transferor's debts, *cf.* U.C.C. § 9-505(b) (2001) (setting forth option of secured party to keep repossessed collateral in satisfaction of debt), but there is no case law on the issue. At a minimum, as subject to auction or retention by the levying creditor, information protected only by trade secret law remains vulnerable in a way that a patent does not. Any buyer of the secret should have substantial fears about the stability of the secret information as an asset and the ability to partition it from interference.

⁴² *See, e.g.,* *Smith v. Dravo*, 203 F.2d 369, 376 (7th Cir. 1953).

⁴³ *See, e.g.,* *Metallurgical Indus. v. Fourtek, Inc.*, 790 F.2d 1195, 1200 (5th Cir. 1986), where the secret is revealed to two potential licensees, Consarc and La Floridienne, who according to the court owe no duty not to reveal it. A transferee would have to find and negotiate with such parties to erect a complete partition.

independently discover it,⁴⁴ a completely effective partition would be staggeringly costly to negotiate by contract.⁴⁵

To feel secure when it acquires an automobile, the firm need only negotiate a simple agreement with the seller and check the state title registry. As we have just seen, partitioning an information asset through contract law and secrecy can be vastly more complex and costly. If the chemical formula, however, is patented, accomplishing a secure transfer of the asset is greatly simplified. If the transferor's interest is recorded in the Patent Office, the transferee's subsequent recordation of its acquisition under 35 U.S.C. § 261⁴⁶ will cheaply partition it from later interference by the transferor, its creditors, heirs, and related entities.⁴⁷ Recording the patent interest, of course, does not make the formula absolutely immune from interference, because an infringement can still occur. No asset partition, however, is ever completely effective. A firm's motor vehicle, for example, can be stolen or damaged by a third party. The point is that the patent title system greatly reduces the cost of identifying the quality of the legal rights the transferor grants and establishes a liability regime that does not require the transferee to enter into a costly array of protective agreements. Furthermore, much like the Uniform Commercial Code, patent law provides for statutory gap-filler terms that further reduce the costs of negotiation and dispute resolution.⁴⁸

It must be noted, however, that in order to obtain the benefits of the patent title recordation system, the transfer of a patent must qualify as an "assignment" of the

⁴⁴ See RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 43 (1988) ("Independent discovery and analysis of publicly available products or information are not improper means of acquisition.").

⁴⁵ The firm would have to extract promises from all other firms with the capacity to reverse engineer or independently discover the secret. Such a fictional negotiation would be further complicated by the firm's desire not to reveal the secret in the course of obtaining a promise from a competitor not to discover it.

⁴⁶ 35 U.S.C. § 261 (2000) "[A]n assignment, grant, or conveyance" that has been properly recorded "[has] the attributes of personal property" and the recorded assignment has priority over any subsequent transfers. *Id.*

⁴⁷ *Id.* ("An assignment, grant, or conveyance shall be void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice, unless it is recorded in the Patent and Trademark Office within three months from its date or prior to the date of the subsequent purchase or mortgage.").

⁴⁸ See, e.g., 35 U.S.C. §§ 200–212 (2000) (governing rights in inventions made with federal assistance); §§ 251–56 (rules governing reissue of defective patents and correction of other mistakes, including mistakenly named inventors); § 261 (providing priority rules between competing claimants); § 271 (defining what constitutes wrongful use of the invention); §§ 282–84 (identifying defenses and providing remedies, including injunctive relief and treble damages); § 285 (attorney's fees available); § 287 (limitations on damages); § 295 (shifting burden of proof in some process patent cases).

invention.⁴⁹ Since courts have interpreted assignment to include only “the exclusive right to make, use, and vend the invention throughout the United States; or . . . an undivided part or share of that exclusive right,”⁵⁰ a non-exclusive licensee cannot effectively record its interest under section 261.⁵¹ This renders a non-exclusive licensee more vulnerable to the creditors of a bankrupt licensor. For example, in *Lubrizol Enterprises v. Richmond Metal Finishers, Inc.*,⁵² the Fourth Circuit held that the trustee of a bankrupt licensor had the right to terminate unilaterally any non-exclusive intellectual property licenses entered into by the debtor/licensor.⁵³ Exercise of the termination right can leave the non-exclusive patent licensee without access to important technology. Using contract law to prevent such an eventuality would require obtaining pre-bankruptcy subordination agreements from all of the licensor’s creditors—an incredibly costly, and maybe impossible, task. In the late 1980s, Congress recognized the dilemma of non-exclusive licensees and enacted 11 U.S.C. § 365(n),⁵⁴ which provides protection against the bankruptcy estate’s right to terminate executory intellectual property licenses.⁵⁵ For non-exclusive licensees,

⁴⁹ See *id.* § 261 (setting forth the form that constitutes “prima facie evidence of the execution of an assignment, grant or conveyance of a patent or application for patent”).

⁵⁰ *Waterman v. McKenzie*, 138 U.S. 252, 255 (1891); accord *In re Cybernetic Serv., Inc.*, 252 F.3d 1039, 1049–50 (9th Cir. 2001).

⁵¹ The Patent Office will permit the physical filing of non-exclusive licenses, but courts have held that permissive filings do not establish priority rights as against third parties. See *Cybernetic Serv.*, 252 F.3d at 1057 (holding that filing of security interest in Patent Office did not perfect creditor’s rights in patent collateral).

⁵² *Lubrizol Enter. v. Richmond Metal Finishers, Inc.*, 756 F.2d 1043 (4th Cir. 1985).

⁵³ See 11 U.S.C. § 365(a) (2000).

⁵⁴ Act of Oct. 18, 1988, Pub. L. No. 100-506, 102 Stat. 2538 (codified as amended at 11 U.S.C. § 365 (2000)).

If the trustee rejects an executory contract under which the debtor is a licensor of a right to intellectual property, the licensee . . . may elect—

....

(B) to retain its rights (including a right to enforce any exclusivity provision of such contract, but excluding any other right under applicable nonbankruptcy law to specific performance of such contract) under such contract . . . to such intellectual property . . .

§§ 365(n)(1). See also 11 U.S.C. § 101(35A) (2000) (“[I]ntellectual property’ means—(A) trade secret; (B) invention, process, design, or plant protected under title 35; (C) patent application; (D) plant variety; [and] (E) work of authorship protected under title 17 . . .”).

⁵⁵ The extent to which section 365(n) helps a licensee of trade secrets is unclear. A licensee almost surely retains the right to continue using the secret, but it may not retain the right to prevent the trustee from licensing the secret to others. The legislation provides that the trustee must recognize the continuing right of the licensee “to enforce any exclusivity provision of such a contract.” 11 U.S.C. § 365(n)(1)(B). See also H.R. REP. NO. 100-1012, at 6–7 (1988).

patent law now works in tandem with bankruptcy law to protect transferees of technology.

The patent registration system lowers the cost of partitioning certain kinds of information assets. Whether the firm is buying or selling an invention, patent recordation reduces the number of contracts and contract terms that must be negotiated. The corporate form achieves the same result with a firm's tangible assets. The cost savings in the context of both the corporate form and the patent form are primarily related to asset transfer.

C. The Corporate Form and the Team Production Problem

Another body of corporate law scholarship suggests how patent law reduces costs of developing and exploiting information assets. When the cost of contracting outside the firm is high, and especially when the cost of preventing post-contractual opportunistic behavior is also high, economists generally expect to see an increased degree of vertical integration.⁵⁶ For example, if a transferee firm's cost of acquiring technology and the risk of post-contractual misbehavior by the transferor is sufficiently high, the firm may rationally decide to conduct its own research and development or, perhaps, to acquire the transferor.⁵⁷ In other words, vertical integration is one way to reduce some of the costs associated with deterring opportunism. Bringing transactions within the firm, however, does not make the problem of opportunistic behavior disappear. Recent commentary explores how the

Under the legislation, any right in the license agreement giving the licensee an exclusive license will still be enforceable by the licensee, but other rights of the licensee cannot be specifically enforced . . .

The debtor/trustee will essentially have no obligation to the licensee after rejection other than to turn over existing technology and permit the licensee to use the technology. . . .

Id. Cf. In re Quad Sys. Corp., 2001 WL 1843379 (E.D. Pa. Mar. 20, 2001). A trade secret license, however, cannot provide true exclusivity for a licensee since it always remains vulnerable to reverse engineering, independent invention, or discovery in public sources. *See* RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 40 (1993). The most a trade secret licensor can promise is to not reveal the secret to others or otherwise use it in violation of the agreement.

⁵⁶ Klein et al., *supra* note 19, at 298 ("[A]s assets become more specific and more appropriable quasi rents are created (and therefore the possible gains from opportunistic behavior increases), the costs of contracting will generally increase more than the costs of vertical integration. Hence, *ceteris paribus*, we are more likely to observe vertical integration."); Edward B. Rock & Michael L. Wachter, *Islands of Conscious Power: Law, Norms, and the Self-Governing Corporation*, 149 U. PENN. L. REV. 1619, 1630 (2001) ("[T]he core reason why transactions are brought within the firm is to solve problems created by the prohibitively high cost of complete contracting.").

⁵⁷ *See* Klein et al., *supra* note 19, at 299 ("[J]oint ownership . . . economize[s] on contracting costs necessary to insure nonopportunistic behavior.").

corporate form minimizes the cost of opportunism within the firm and sheds light on how patent law can serve the same function when development and exploitation of information assets takes place within the firm structure as well as among multiple parties.

Modern analysis of corporate governance rules has long focused on agency problems.⁵⁸ Corporate shareholders have been characterized as the owners of a firm run by a board of directors whose prime concern should be maximizing the firm's value for the owners' benefit.⁵⁹ For this reason, the virtual independence of the board from shareholder control has been seen by many commentators as creating significant principal-agent problems.⁶⁰ Others, however, have suggested that the independence of directors can be positively perceived, as a "'mediating hierarchy' . . . [having] the purpose and effect of insulating corporate directors from the direct command and control of *any* of the groups that comprise the corporate team, including its shareholders."⁶¹ Corporate law scholars like Blair and Stout do not deny the existence of agency costs, but argue that insulating the board from shareholder control is critical to solving important team production problems.

They explain:

In the economic literature, team production problems are said to arise in situations where a productive activity requires the combined investment and coordinated efforts of two or more individuals or groups. If the team members' investments are firm-specific (that is, difficult to recover once committed to the project), and if output from the enterprise is nonseparable (meaning that it is difficult to attribute any particular portion of the joint output to any particular member's contribution), serious problems can arise in determining how any economic surpluses generated by team production—any "rents"—should be divided.⁶²

The team consists not only of shareholders who provide some of the capital for the firm, but also others who make firm-specific investments, such as "[e]xecutives, rank-and-file employees, and even creditors [and] the local community."⁶³ Since production within the firm requires cooperation among multiple participants, the

⁵⁸ See, e.g., Eugene F. Fama, *Agency Problems and the Theory of the Firm*, 88 J. POL. ECON. 288 (1980); Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305 (1976); ROBERTA ROMANO, *FOUNDATIONS OF CORPORATE LAW* (1993). For additional sources, see Blair & Stout, *supra* note 21, at 248 n.1.

⁵⁹ See, e.g., FRANK H. EASTERBROOK & DANIEL R. FISCHEL, *THE ECONOMIC STRUCTURE OF CORPORATE LAW* (1991).

⁶⁰ See *id.*

⁶¹ Blair & Stout, *supra* note 21, at 255.

⁶² *Id.* at 249.

⁶³ *Id.* at 250.

threat of opportunism that drives vertical integration continues to pose problems after integration is achieved.

According to Blair and Stout, two common sorts of problems arise. First, "If the team members agree in advance to allocate any profits according to some fixed sharing rule, obvious free-rider problems arise: Each team member will have an incentive to shirk, since he will get the same share of the total whether or not he works hard."⁶⁴ Shirking can be addressed by a merit reward system, but:

[I]f the team members have no fixed sharing rule [and] simply agree to allocate rewards after the fact, when the time comes to divvy up the surplus all have incentives to indulge in wasteful rent-seeking, squandering time and effort haggling and trying to grab a larger share of the total output.⁶⁵

Ideally, the members of the team would be able to deal with shirking and opportunism by ex-ante contracting, but it is frequently too costly to ensure cooperation and to deter opportunism by contract.⁶⁶ Given the number of individuals and groups that make firm-specific contributions, often of varying and incommensurate sizes, it is easy to see how contract law alone is insufficient.

The corporate form provides a solution to team production problems by allowing "rational individuals who hope to profit from team production to overcome shirking and rent-seeking by opting into an internal governance structure . . . the 'mediating hierarchy.'"⁶⁷ In essence, the corporate form allows team members to give up a degree of control over the enterprise to "an internal hierarchy whose job is to coordinate the activities of the team members, allocate the resulting production, and mediate disputes among team members over that allocation."⁶⁸ It is the independence of the board of directors sitting atop the hierarchy that enables it to monitor the contributions of team members and appropriately allocate rents and risks. Instead of being a problem for shareholders, the independence of the directors can, in theory, increase the likelihood that the corporate team will function in a mutually beneficial manner. For example, if shareholders directly controlled decisions to issue themselves dividends, the willingness of lenders and employees of the corporation to make

⁶⁴ *Id.* at 266.

⁶⁵ *Id.*

⁶⁶ But see Robert P. Merges, *The Law and Economics of Employee Inventions*, 13 HARV. J. L. & TECH. 1, 20-26 (1999) (demonstrating how default common law ownership rules ameliorate some team production problems).

⁶⁷ See Blair & Stout, *supra* note 21, at 250. For a discussion of the theory of the "second best," see Kelvin Lancaster & Richard Lipsey, *The General Theory of the Second Best*, in KELVIN LANCASTER, TRADE, MARKETS, AND WELFARE 193 (1996). In theory, the best solution would be explicit contracts covering all important contingencies and negotiated at a reasonable cost. In complex enterprises, this is often not possible.

⁶⁸ See Blair & Stout, *supra* note 21, at 251.

optimal firm-specific investments would be deterred. They would be genuinely concerned by the prospect that shareholders would divert those investments to themselves and away from the firm.

The team production explanation of the evolution of the corporate form is not necessarily a normative prescription for firm governance. There is no guarantee that a board will adequately monitor shirking, fairly allocate rents, or effectively mediate disputes. The theory, however, may explain why the law treats directors more like trustees than as agents, shielding them from shareholder control by limiting the effectiveness of shareholder voting rights and protecting them in derivative litigation through the business judgment rule.⁶⁹ It also helps explain why comparatively fewer complex enterprises are operated as partnerships.⁷⁰ Whether Blair and Stout's explanation of how a mediating hierarchy reduces team production problems is convincing in all its details, the importance of cooperation in team production is undisputed. Analyzing patent law as the solution to specific types of team production problems helps us understand its evolution and present form and points descriptive analysis away from purely incentive-based justifications for patent law.

D. The Patent Form and Team Production Problems

The team production problem is particularly acute in the case of information assets, and the patent form ameliorates them in a number of different ways. Within a single firm, patent registration reduces the need to fence information off between team members and enhances trust and cooperation. Additionally, in the context of transfers of information assets between firms, especially in cases involving joint production, several commentators have already noted cost savings in assembling a functioning team.⁷¹ Most importantly, this section explores for the first time how the patent form facilitates the creation of a cost-reducing mediating hierarchy in contexts as diverse as academic research, patent pools, and debtor financing.

1. Fencing Costs, Patents, and Team Cooperation

Imagine our hypothetical firm contemplating the exploitation of a secret chemical formula. The firm would like to use the formula in the production of a new car wax, but it must decide whether to apply for a patent or keep the formula secret. Given the number of team members usually involved in bringing a new product to market, the choice of trade secrecy over patent protection will significantly raise the firm's cost of innovation. In the absence of a patent, there will be no record owner of the chemical

⁶⁹ *Id.* at 290–305.

⁷⁰ *Id.* at 320–28.

⁷¹ See ASHISH ARORA & ROBERT P. MERGES, PROPERTY RIGHTS, FIRM BOUNDARIES, AND R&D INPUTS 5 (2001) at http://papers.ssm.com/sol3/papers.cfm?abstract_id=255869.

formula, and its intangible nature will make it vulnerable to misappropriation by team members. A firm will rationally choose to reduce the possibility of misappropriation by extracting promises of confidentiality, physically fencing the secret off from team members, or both. The cost of taking contractual precautions is especially easy to see in a case like *Rockwell Graphic Systems, Inc. v. DEV Industries*,⁷² where a firm engaged in the manufacture of printing presses protected its secret part drawings through hundreds of confidentiality agreements signed by employees and subcontractors.⁷³ The time and effort necessary to administer, monitor, and enforce confidentiality in the large team context is substantial, even where form confidentiality agreements can be used to lower the cost of contracting. In addition, non-compete agreements may need to be negotiated and enforced in order to prevent the misappropriation threat that arises when an employee leaves the firm.⁷⁴

Apart from taking costly contractual measures, taking additional physical precautions may involve hiring security personnel, installing alarm systems, or erecting other barriers between workers and secret equipment or processes.⁷⁵ Taking precautions can lead to production inefficiencies and an erosion of trust among team members. Members may become hesitant to exchange information within the team because anyone exposed to a secret can behave opportunistically in the precise sense used by Blair and Stout.⁷⁶ By misappropriating the secret, a team member can engage in unilateral and non-consensual ex post allocation of the rents. With tangible assets, the corporate form addresses this problem by assigning ownership to the corporation and the rent allocation task to an independent board of directors. The corporate form by itself, however, cannot effectively prevent opportunistic misallocation of intangible information assets protected merely by trade secret law. By choosing patent protection, any enterprise—a partnership, sole proprietorship, or corporation—can record its ownership of the asset, thereby deterring misappropriation while reducing the need to erect costly fences. To paraphrase Klein et al., patent law allows firms to “economiz[e] on contracting costs necessary to assure nonopportunistic behavior in

⁷² *Rockwell Graphic Sys., Inc. v. DEV Indus.*, 925 F.2d 174 (7th Cir. 1991) (Posner, J.).

⁷³ *Id.* at 177 (“Rockwell employs 200 [engineers who are] required to sign agreements not to disseminate the drawings . . . [V]endors . . . too are required to sign confidentiality agreements, and in addition each drawing is stamped with a legend stating that it contains proprietary material.”).

⁷⁴ See ROBERT P. MERGES ET AL., *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 84–96 (2d ed. 2000) (discussing the legally permissible scope of restrictions on employees who leave the firm).

⁷⁵ See, e.g., *Metallurgical Indus., Inc. v. Fourtek, Inc.*, 790 F.2d 1195, 1199 (5th Cir. 1986) (noting trade secret owner’s “security measures taken to conceal the furnaces from all but authorized personnel. The furnaces were . . . hidden from public view, while signs warned all about restricted access.”).

⁷⁶ See Blair & Stout, *supra* note 65 and accompanying text.

the presence of appropriable quasi rents.”⁷⁷ By establishing clear title, the patent recordation system reduces the firm’s cost of keeping secrets and therefore helps reduce the cost of deterring opportunistic rent seeking by team members while simultaneously increasing trust and cooperation within the team.

2. Patents and Inter-Firm Team Building

Several important studies suggest that the patent form also enables relationships between firms engaging in cooperative ventures of various sorts. The problem of opportunism discussed above suggests that an essential information asset protected only by trade secret law would be more difficult to bargain over than information embodied in a patent. In fact, Gallini and Winter were willing to conclude that in many circumstances, “[l]icensing occurs in such a market *only if* patent protection is available to the licensor.”⁷⁸ The patent form enables a potential transferor to share an information asset without fear of misappropriation while assembling the complex team necessary to commercialize a new product. Negotiating is also facilitated by the fact that the “metes and bounds” of the patented invention are delineated with relative clarity because of patent law’s written description and enablement requirements.⁷⁹ In other words, the scope of the information asset bargained over and shared is usually clearer when embodied in the patent form. Gallini and Winter state: “[T]he role of patents in our model is not the traditional role of creating monopolies by *prohibiting* the exploitation of informational spillovers. Rather, by protecting property rights, patents here *open* the market for trade in technological information.”⁸⁰

In the context of inter-firm team assembly, Arora et al. conclude that the patent form is especially effective at reducing the cost of contracting when “know how” must be transferred.⁸¹ They note:

Transferring tacit ‘know-how’ is costly and difficult, often requiring individual training. On the licensor’s side, there is little to guarantee that the technology recipient will pay after the transfer—after all, it cannot ‘unlearn’ and return what the licensor has taught it. On the licensee’s side, there is little to guarantee that the licensor will send its best engineers or transfer all it knows. In light of this well-known conundrum, drafting an enforceable contract is virtually impossible without

⁷⁷ See Klein et al., *supra* note 19, at 307.

⁷⁸ Gallini & Winter, *supra* note 16, at 238 (emphasis added).

⁷⁹ See 35 U.S.C. § 112 (2000).

⁸⁰ Gallini & Winter, *supra* note 16, at 238. See also F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 732 (2001) (“For example, complete transferability is important to ensure that commercialization is conducted by the lowest cost provider.”).

⁸¹ HAHN, *supra* note 5, at 29 (citing ASHISH ARORA ET AL., *MARKETS FOR TECHNOLOGY: THE ECONOMICS OF INNOVATION AND CORPORATE STRATEGY* (2002)).

some additional means to ensure compliance. That is where patents come in. The licensor can revoke the use of a patent if the licensee fails to pay after receiving the trade secret portion of the knowledge transfer. The licensee can refuse to pay royalties if the licensor does not transfer adequate know-how.⁸²

The patent facilitates compliance measures and thereby enhances trust and cooperation.

In their examination of the relationship between independent input suppliers—smaller research-specific firms—and large firms with greater commercialization capacity, Arora and Merges find that patents “reduce the risk of buyer firm opportunism.”⁸³ The patent enables the creation of a team consisting of a small independent research firm or individual inventor and a larger firm that requires specialized expertise. Arora and Merges find that when the cost of opportunism is reduced, increased trust among the inter-firm team creates synergy and enables specialization and positive information spillovers.⁸⁴ The empirical data they collect shows that robust patent protection plays a significant role in facilitating technology sharing between the set of firms best situated to conduct research and the set of firms best situated to engage in commercialization of information assets.⁸⁵

Finally, although invention within the academic context is discussed in more detail below, it is worth noting here the effect the Bayh-Dole Act of 1980 had on patenting behavior in research institutions.⁸⁶ In 1980, Congress made it much easier for universities to patent their research. Although studies measuring patent citation suggest that the change did not stimulate more or better research, rates of academic patenting and licensing exploded.⁸⁷ In other words, the option of utilizing the patent form enabled an increase in technology sharing. In their article, Henderson et al. concluded that “the increase in university patenting probably reflects an increased rate of technology transfer to the private sector, and this has probably increased the social rate of return to university research.”⁸⁸ Patenting and licensing have become critical to universities because such institutions are usually ill-equipped to commercialize inventions. They typically must partner with private firms.⁸⁹ Cooperation is a two-way street, however. Hahn notes that “a university inventor’s continued participation is apparently key to developing a commercially viable product from the initial

⁸² *Id.* at 30 (citing ARORA ET AL., *supra* note 81).

⁸³ See Arora & Merges, *supra* note 71, at 1.

⁸⁴ See *id.* at 3.

⁸⁵ See *id.* at 14, 19–20.

⁸⁶ See 35 U.S.C. §§ 200–12 (2000).

⁸⁷ See Rebecca Henderson et al., *Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965–1988*, 80 REV. ECON. & STAT. 119 (1998).

⁸⁸ *Id.* at 126.

⁸⁹ See HAHN, *supra* note 5, at 25.

embryonic invention.”⁹⁰ The sudden availability of the patent form apparently enabled the creation of the complex public-private teams necessary to exploit certain inventive activity.⁹¹ Data from national laboratories after Congress authorized the use of Cooperative Research and Development Agreements (CRADAs) tell a similar story.⁹²

This connection between patenting and increased technology transfer previews and underlines the normative thesis set forth more fully in Part III: Even where the availability of a patent does not stimulate more research, the reduction of transaction costs associated with the patent form may be sufficient in and of itself to stimulate technology transfer and exploitation, thereby providing a significant justification for the patent system.

3. Patents, Monitoring Costs and the Creation of Mediating Hierarchs

The most striking way patents facilitate team production can be seen in how they are used to create “mediating hierarchs.” The term has not yet found its way into the intellectual property literature, but it provides a theoretical construct to illustrate how the patent registration system lowers transactions costs in settings as diverse as individual firms, academic institutions, patent pools, and financial institutions.

In their general discussion of the firm, Alchian and Demsetz propose a hierarchy where one team member has the responsibility of monitoring shirking problems and in return receives any residual rents from the enterprise.⁹³ Such a monitor has powerful incentives to coordinate efficient production among members of the team. Alchian and Demsetz have, nonetheless, been criticized on the ground that their model assumes away “any productive advantages from horizontal interactions among specialized team members.”⁹⁴ In particular, employees are left “with no stake in the

⁹⁰ *Id.* See also Richard Jensen & Marie Thursby, *Proofs and Prototypes for Sale: The Licensing of University Inventions*, 91 AM. ECON. REV. 240, 243 (2001) (“For 71 percent of the inventions licensed, respondents claim that successful commercialization requires cooperation by the inventor and the licensee in further development.”).

⁹¹ See HAHN, *supra* note 5, at 25 (“Jensen and Thursby argue that . . . patents allow for contracts that solve the moral hazard problem: the developer can receive exclusive rights while royalty payments (or, less commonly, equity stakes) stipulated in the license provide incentives for the inventor to provide continued support.”).

⁹² See Adam B. Jaffe & Josh Lerner, *Reinventing Public R&D: Patent Policy and the Commercialization of National Laboratory Technologies*, 32 RAND J. ECON. 167 (2001) (examining federal R&D initiatives at national laboratories and finding “a substantial impact on the laboratories’ patenting”).

⁹³ See Armen A. Alchian & Harold Demsetz, *Production, Information Costs, and Economic Organization*, 62 AM ECON. REV. 777, 781–82 (1972), *cited in* Blair & Stout, *supra* note 21, at 266 & n.36.

⁹⁴ See Blair & Stout, *supra* note 21, at 275.

enterprise and no firm-specific investment.”⁹⁵ Blair and Stout, therefore, do not accept that “the best solution is to allocate control rights . . . to the party whose specialized investment is most critical to the success of the enterprise.”⁹⁶

They prefer instead the suggestion of Rajan and Zingales that relinquishing control to a disinterested monitor outside the production team is often more efficient.⁹⁷ They assert that a third party who makes no firm-specific investment, but who is trusted by the team and who receives a nominal share of the rents produced by the enterprise, may do a better job of maximizing team output.⁹⁸ If the outside monitor is given authority to build and maintain a productive team, then team members may “feel they can now safely invest.”⁹⁹ Blair and Stout argue that Rajan and Zingales’s defense of outside monitoring provides a powerful explanation for the popularity of the corporate form. In a public corporation, an independent board of directors can play the same role as an outside monitor, disinterestedly punishing shirking, resolving disputes, and deciding how best to distribute or reinvest excess earnings.¹⁰⁰

Patent law plays at least two cost-reducing roles in the monitoring context. First, it can reduce the cost of monitoring, regardless of whether the monitor is independent (Blair & Stout) or a team member (Alchian & Demsetz). Second, where the creation of a mediating hierarch is desirable, patent law can facilitate independent monitoring even when the corporate form is not available.

Private firms. In general, the choice to patent information assets makes the monitoring task less costly. One important economic study finds that business “executives identified [a motive] for patenting that [has] little connection with appropriating returns from investment[:] . . . to measure the performance of R&D employees, which is a significant problem because these workers are typically engaged in team production.”¹⁰¹ Patent counts can play a significant role in tracking productivity and performance within the firm. For example, compensation can be adjusted on the basis of patents successfully applied for. One of my students worked as an intellectual property manager in a prominent multinational corporation, and he reports a system of colored badges issued to identify researchers by the number of

⁹⁵ *Id.*

⁹⁶ *Id.* at 272–73 (“[I]f A’s contribution to the research effort is more vital than B’s, the best we can do is to protect and encourage A’s investment by making A the ‘owner’ of the enterprise.”).

⁹⁷ See Raghuram G. Rajan & Luigi Zingales, *Power in a Theory of the Firm*, 113 Q.J. ECON. 387, 422–24 (1998).

⁹⁸ *Id.*, cited and discussed in Blair & Stout, *supra* note 21, at 274 & n.57.

⁹⁹ Blair & Stout, *supra* note 21, at 274 & n.57.

¹⁰⁰ *Id.* at 275–76.

¹⁰¹ See Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 798 (1987).

patents obtained for the company.¹⁰² Other more tangible benefits also accrued when certain patenting milestones were met.¹⁰³ Significantly, badge color was based on the number of patents awarded, not on the basis of the income they produced for the employer.¹⁰⁴

In addition, patent law requires that the true inventor(s) be listed on the patent application.¹⁰⁵ The primary contributor to the invention is therefore established early on, settling at least one possible source of team friction and providing a locus for negotiations.¹⁰⁶ Monitoring team production is more difficult when innovation involves a trade secret. Information is suppressed, even within the firm, when trade secrets are at issue. And in the absence of a clear title system, establishing credit for a secret contribution is more difficult, as is assigning blame if the information mysteriously leaks to other firms.

Academic Institutions. Critically, the patent form can facilitate the creation of a mediating hierarchy even in the absence of incorporation. Consider the university setting, which fosters a great deal of inventive activity in the United States. Academics are typically institutional employees; their salaries are dependent on a combination of teaching competence and publication record in academic journals. Most institutions of higher education, however, have established special foundations to facilitate the sharing of rents generated by research.¹⁰⁷ At the University of Georgia, in return for the promise to assign patents to the University, researchers are given a percentage of royalties earned from licenses administered by the University of Georgia Research Foundation.¹⁰⁸ University foundations operate relatively independently, like boards of directors in public corporations, so concerns about shirking and rent allocation among team members—inventive professors, their colleagues, public and private grantors, and the university administration—may be reduced.

¹⁰² Interview with Russell F.R. Denton, Attorney, King & Spalding in Athens, Ga. (Feb. 10, 2004).

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ See 35 U.S.C. § 102(g) (2000) (priority rules for competing inventors); § 111 (application); § 116 (joint inventorship).

¹⁰⁶ See Levin et al., *supra* note 101, at 798 & n.29 (noting that in some industries, participation requires access to multiple patents often held by multiple firms and “a prudent new entrant will establish a patent portfolio of its own, thus compelling established firms to negotiate cross-license agreements”).

¹⁰⁷ See, e.g., <http://www.stanford.edu/dept/ORA/> (representing Stanford University’s state of the art research administration center) (last visited Feb. 2, 2005).

¹⁰⁸ Interview with Rebecca Downey, University of Georgia Research Foundation in Athens, Ga. (June 15, 2002). See <http://www.ovpr.uga.edu/ugarf> (representing the University of Georgia’s Research Foundation, Inc.) (last visited Feb. 2, 2005).

When an independent foundation or other outside body is charged with monitoring shirking and allocating rents, all team members should feel more free to invest. Creating an effective mediating hierarch in the absence of a patent, however, is less practicable. The inventor/academic could theoretically assign his interest in a trade secret to the university, but this would create uncertainties not present in the patent context. Because one cannot register title to a secret, the assignment of a trade secret would consist of nothing more than the researcher's promise to reveal information to the university, combined with a promise not to reveal it to anyone else. The monitor's role after revelation is ambiguous. Is the information really secret or do others skilled in the art already know it? And how much is it worth? Arrow's information paradox suggests that licensing the secret and realizing its value will be difficult.¹⁰⁹ A patented invention, although subject to challenge, has at least been approved by the patent office as new, useful, and a nonobvious advance over the prior art.¹¹⁰ More importantly, perhaps, the patent office will decide who owns a patent as between two competing claimants. Although the quality of patent office scrutiny has been criticized, to an independent monitor with no special expertise in any one field, a patent provides valuable information. No such outside imprimatur is available for trade secrets.

The patent registration system therefore provides a form around which a complex team can be effectively organized outside the context of incorporation. If the professor/researcher is willing to assign all rights in the patent to an expert non-team member, such as a university foundation, then something like the disinterested outside monitor preferred by Blair and Stout, and Rajan and Zingales, is created:

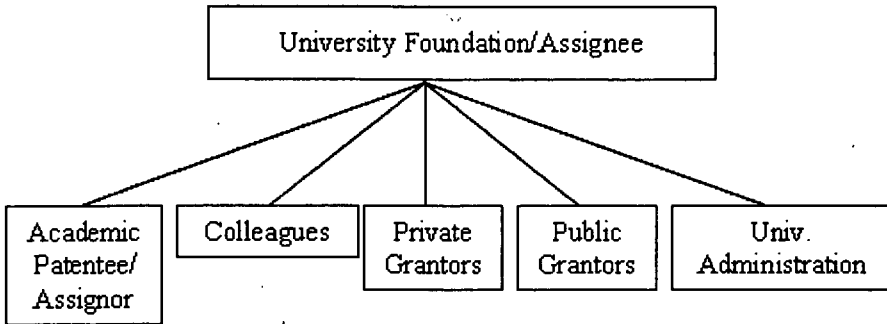
¹⁰⁹ See Robert G. Bone, *A New Look at Trade Secret Law: Doctrine in Search of Justification*, 86 CAL. L. REV. 241, 280 (1998) (citing KENNETH J. ARROW, ECONOMIC WELFARE AND THE ALLOCATION OF RESOURCES FOR INVENTION, in *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY* 614-16 (1962)).

[T]here is a significant obstacle—known as “Arrow’s Information Paradox”—to bargaining over secret information. A trade secret owner generally is reluctant to reveal the secret unless the potential licensee first promises not to use it in the event a license is not negotiated. The licensee, on the other hand, is not likely to make such a promise without first learning the secret.

Id.

¹¹⁰ See 35 U.S.C. §§ 101-03 (2000).

Diagram A: Monitoring by Non-Team Member



This essay need not decide whether inside or outside monitoring is generally preferable to attain entrepreneurial objectives. What is important is that the patent form facilitates the choice between monitoring forms, even in the absence of a corporate structure, and reduces monitoring costs, regardless of the form chosen.

Patent Pools. Merges has already pointed out how patent pools reduce transaction costs between members when access to multiple technologies owned by multiple parties is necessary for innovation and commercialization.¹¹¹ Transacting over valuable technology can be costly when multiple parties each have control of essential components. One way to facilitate follow-on improvement and commercialization is an agreement by all rights holders to grant cross-licenses to their competitors. In theory and practice, patent pools can “combine far-flung property rights into useable bundles, overcoming the tragedy of the anticommons while preserving the incentives that come with these rights.”¹¹²

Deciding how much to compensate each licensor, however, is a potential stumbling block to the creation of a technology pool. Without an effective monitor, squabbling over the relative value of inputs and other compensation issues can doom a collective rights enterprise. Neither the Demsetz-Alchian solution of appointing a single team member, nor the Stout-Blair solution of incorporation, is typically feasible. Nonetheless, patent pools have found a way to utilize the concept of the

¹¹¹ See Robert P. Merges, *Institutions for Intellectual Property Transactions: The Case of Patent Pools*, in EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY: INNOVATION POLICY FOR THE KNOWLEDGE SOCIETY 123, 129 (Rochelle Dreyfuss et al. eds., 2001).

A patent pool is an arrangement among multiple patent holders to aggregate their patents. A typical pool makes all pooled patents available to each member of the pool. Pools also usually offer standard licensing terms to licensees who are not members of the pool. In addition, the typical patent pool allocates a portion of the licensing fees to each member according to a preset formula or procedure.

Id.

¹¹² *Id.*

mediating hierarch. A passage from the 1935 Congressional Patent Pool Hearings on aviation technologies discussed by Merges demonstrates one approach:

“[I]n the airplane cross-licensing agreement, after completely abolishing the monopoly of the individual inventor and opening every patent to every member of the association, it provides that a board of arbitrators may decide in any case what reward should be paid to the individual patent owners and this is based not upon the official determination of patentability by the Patent Office, but upon the unofficial determination of the importance of the invention by a board of arbitrators.”¹¹³

More, recently, the MPEG-2 pool of nine patentees holding the 27 patents essential to the exploitation of standard MPEG video technology adopted a slightly different structure that included “expert administrative valuation procedures for . . . determining royalty splits among members and . . . a negotiation framework for determining whether new technologies merit addition to the pool; and a pre-agreed procedure for settling disputes.”¹¹⁴

In essence, the pool administration, however constituted, functions as a monitor, trusted by its members to maximize cooperation between team members, the various licensors in the pool, in order to generate the most returns for the group enterprise.¹¹⁵ In this context, patents lower monitoring costs in two ways. First, the registration system minimizes opportunism among members. Inventors can patent first and then approach the pool without fear that information will be misappropriated. It is difficult to imagine how an efficient trade secret pool could even function. Reducing opportunism, however, is just half of the battle; the valuation/compensation problem remains. Here again, the patent registration system makes the job of monitoring easier. The clear delineation of rights within patent claims makes it easier for the monitor to identify inputs and their relative contributions to the technology. Not only is it clearer who contributed which pieces to the puzzle, the size and shape of each piece is carefully set forth in the claims accepted by and registered in the patent office. Imagine a monitor attempting to value the relative contribution of a dozen trade secrets to a complex technology. With no document fixing the scope of what each contributor “owned,” the task would quickly become unwieldy.¹¹⁶

¹¹³ *Id.* at 136 (emphasis omitted) (quoting *Pooling of Patents: Hearings on H.R. 4523 Before the House Comm. on Patents*, 74th Cong. 1140, 1144–45 (1935)).

¹¹⁴ *Id.* at 148.

¹¹⁵ This is precisely why, however, patent pools are the subject of significant antitrust scrutiny. Michael Bednarek, *Patent Pools as an Alternative to Patent Wars in Emergent Sectors*, 16 J. PROPRIETARY RTS. NO. 7, at 1, 3 (2004) (“Patent pools have long been the subject of scrutiny by antitrust regulators.”).

¹¹⁶ Especially since more than one party can own a trade secret. Trade secret law does not require absolute secrecy. See RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (1995) (requiring only that the secret be not “generally known or readily ascertainable”).

Secured Financing. The patent form has advantages over trade secrecy in reducing one other potentially important monitoring cost. When the innovative team includes a creditor who is providing the capital necessary for team production, the patent recordation system makes it significantly less costly for the creditor to monitor the status of the information assets securing its investment. For example, if the firm's most valuable asset is a chemical formula, it may be necessary to offer it as security for a loan. Although it is possible to grant a security interest in a trade secret,¹¹⁷ it is unattractive collateral. If the secret leaks out, either through revelation, reverse engineering, or independent invention, its value as collateral is destroyed. Even if the secret can be kept, patent law provides several distinct advantages that lower a lender's monitoring costs.

A significant cost of secured lending is monitoring the assets of the debtor to ensure that they are not wasted or substituted in such a way such that the debtor is less likely to satisfy its obligations.¹¹⁸ If the debtor's main asset is a fleet of motor vehicles, for example, a secured lender can relatively easily keep track of where they are stored, how they are serviced and used, and when they are replaced. Best of all, a secured creditor can take possession of vehicle certificates of title, making it very difficult for the debtor to make an unauthorized disposition of the collateral. It is easy to see why monitoring collateral like a chemical formula protected only by trade secrecy is so difficult. If the debtor's most important asset is a secret, then the lender must assure itself that the debtor is taking adequate physical and contractual precautions to keep it hidden and is not engaged in unauthorized licensing of the secret formula. Monitoring the status of a trade secret is clearly much more difficult than monitoring the status of a patented invention, or a motor vehicle. Once the chemical formula is patented, the lender need not monitor the quality of the debtor's fencing efforts; it need only take an assignment of the patent and properly record it in the Patent Office.

Even a patented formula, however, can be infringed, and discovering and deterring illegal uses of the asset by competitors of the debtor is the most significant monitoring cost in the context of intellectual property collateral. Once again, monitoring is easier to do if the formula is patented. If the debtor uses the formula in a car wax and is suddenly faced with a competitor selling the same product, patent law provides for immediate injunctive relief.¹¹⁹ If the formula is only protected by trade secret law, however, the competitor's use of the formula could well be legal, and further fact-finding will be necessary to reveal whether the competitor

¹¹⁷ See U.C.C. § 9-102 (2003) (defining "general intangibles"). Cf. *Matter of Roman Cleanser Co.*, 802 F.2d 207, 212 (6th Cir.1986) (involving secret formulas and customer lists taken as collateral). An exhaustive search by the author revealed no cases discussing the status of trade secrets as collateral.

¹¹⁸ See RANDAL PICKER ET AL., *SECURITY INTERESTS IN PERSONAL PROPERTY* 32-37 (2002).

¹¹⁹ See 35 U.S.C. § 283 (2000).

misappropriated the formula or whether it reverse engineered or independently discovered it. In response, patent law provides a lender with an easy method to protect its interests when it does not trust a debtor to pursue legal action to preserve the value of the formula by suing infringers. Long ago, the Supreme Court in *Waterman v. McKenzie* sanctioned a form of secured lending whereby the lender takes a complete assignment of the patent rights, records its interest under section 261, and then grants back an exclusive license to the debtor/inventor.¹²⁰ This procedure gives standing to the lender to enforce the patent in its own name and collect damages.¹²¹

Most importantly, this same procedure can be used to put a specialized lender in the role of mediating hierarch—a neutral arbiter of team production interested in maximizing the value of the patent it now controls. Although he does not use the term “team production” in his classic article on secured financing, Scott is aware of how a secured lender/hierarch can solve monitoring problems in the team production context. He notes that secured lending can address “the underinvestment phenomenon . . . the general principle that an agent [(the debtor)] will systematically fail to exercise the effort necessary to maximize the joint product where part of the returns must be repaid to the principal [(the lender)] in the form of a fixed royalty or commission.”¹²² The monitoring problem he identifies can be solved by “[t]he leverage obtained by holding the debtor’s assets hostage [which] empowers the secure creditor to influence the debtor’s business decisions, thus ensuring that new projects are properly developed.”¹²³ The practice blessed in *McKenzie*, where the lender holds registered title while the debtor takes back an exclusive license, gives the lender, now serving as mediating hierarch, the sort of control over monitoring that Scott describes.

It must be emphasized that savings in monitoring costs are not trivial; the primary normative economic defense of secured lending is based on such savings.¹²⁴ A great

¹²⁰ *Waterman v. McKenzie*, 138 U.S. 252, 255 (1891).

¹²¹ *Id.*

¹²² Robert Scott, *A Relational Theory of Secured Financing*, 86 COLUM. L. REV. 901, 921 (1986).

¹²³ *Id.* at 904.

¹²⁴ See Gus Triantis, *Financial Slack Policy and the Laws of Secured Credit*, 29 J. LEGAL STUD. 35, 43 (2000) (“Moreover, the granting of asset-based security interests to some creditors shapes the monitoring incentives of those parties and the remaining unsecured creditors, and it thereby coordinates monitoring activity.”). *Id.* at 43 n.29 (“The monitoring explanation for secured debt is prominent in the law and economics literature.” (citing Thomas Jackson & Anthony Kronman, *Secured Financing and Priorities Among Creditors*, 88 YALE L. J. 1143 (1979); Alan Schwartz, *Security Interests and Bankruptcy Priorities: A Review of Current Theories*, 10 J. LEGAL STUD. 1 (1981); Saul Levmore, *Monitors and Freeriders in Commercial and Corporate Settings*, 92 YALE L. J. 49 (1982))). See also Barry Adler, *An Equity-Agency Solution to the Bankruptcy Priority Puzzle*, 22 J. LEGAL STUD. 73 (1993); Richard Barnes, *The Efficiency Justification for Secured Transactions: Foxes with Soxes and Other Fanciful Stuff*, 42 U. KAN. L. REV. 13 (1993). Not all commentators are convinced that rules of secured lending are justified by lowered

deal more empirical work needs to be done on the role patent rights play in reducing the cost of secured lending, but monitoring-costs savings in this context may have significant power in explaining some patenting behavior.

III. PATENT PARADOXES AND THE CASE OF THE DISAPPEARING PATENTS

The transaction costs theory of patent law fits better with the existing empirical data than does a pure incentive theory. Unlike theories that emphasize the incentive effect of rewards for invention or innovation, a focus on transaction costs savings is not inconsistent with empirical studies demonstrating: (i) the poor correlation between R&D and patenting shown in recent studies on the impact of the Federal Circuit on the behavior of inventive firms, the "Patent Paradox;"¹²⁵ and (ii) the prevalence of patenting despite low levels of licensing, use, and highly uncertain prospects for super-competitive profits, "The Case of the Disappearing Patents."¹²⁶

The creation of the Federal Circuit Court of Appeals prompted a spate of interesting studies measuring patenting behavior that have defied explanation by simple incentive theories. In 1982, Congress created the Federal Circuit and gave it exclusive jurisdiction over appeals in cases of patent infringement. The patent validity rate began climbing immediately, almost doubling between 1982 and 1988.¹²⁷ A pure incentive theory of patent law would predict that an increase in the validity rate would stimulate increased spending in research and development.¹²⁸ Greater protection for inventions should have meant greater investment in creating them, but precisely the opposite happened. A study by Bessen and Maskin found that "[t]he late 80's display a leveling off and possibly a reversal of an upward trend in research intensity over the previous decade. There does not appear to be so much as a 10% increase in R&D

monitoring costs. See Alan Schwartz, *The Continuing Puzzle of Secured Debt*, 37 VAND. L. REV. 1051 (1984).

¹²⁵ See Bronwyn Hall & Rosemarie Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 101 (2001).

¹²⁶ See JOHN ALLISON ET AL., VALUABLE PATENTS 1 (Geo. Mason U. School of Law, Working Paper No. 03-31, 2003) ("Ninety-nine percent of patent owners never even bother to file suit to enforce their rights. They spend \$4.33 billion per year to obtain patents, but no one seems to know exactly what happens to most of them. Call it 'The Case of the Disappearing Patents.'"). See also Barnaby Felder, *Patent Donations are Novel Corporate Gift*, NY TIMES, Nov. 17, 2002, at 5 (noting that in some companies, less than ten percent of patented inventions are used or licensed).

¹²⁷ See Donald Dunner et al., *A Statistical Look at the Federal Circuit's Patent Decisions: 1982-1994*, 5 FED. CIR. BAR J. 151, 154-56 (1995) (presenting statistics of the patent validity rate—the rate at which patents are declared valid in litigation).

¹²⁸ See Hall & Ziedonis, *supra* note 125, at 105 ("[T]he patent system aims to encourage inventors to direct more of their resources toward R&D than would otherwise be the case.").

intensity among firms and industries obtaining software patents.”¹²⁹ Hall and Ziedonis reported that “survey evidence suggests that firms in most industries have *not* increased their reliance on patents for appropriating returns to R&D over the decade of the 1980s. Yet, this period coincides with an unprecedented surge in patenting in the United States”¹³⁰ The increased validity rate stimulated more patenting, but not more investment in research.¹³¹ As already noted, a boom in patenting in the early 1980s stimulated by the Bayh-Dole Act did not correlate with increased research, as measured by patent counts.¹³²

In addition, economic studies suggesting that increasing patent protection does not necessarily provide added incentives for invention are consistent with doubts previously articulated by economists concerning the nature of the value of exclusive patent rights.¹³³ The traditional theory that granting exclusive rights provides significant incentives sits very uneasily with mounting evidence that “most issued patents are worthless, or very nearly worthless [without] market value, much less market power.”¹³⁴ Few patents allow their owners to charge super-competitive prices

¹²⁹ JAMES BESSEN & ERIC MASKIN, SEQUENTIAL INNOVATION, PATENTS, AND IMITATION 18 (MIT Econ. Dept., Working Paper No. 00-01, 2000).

¹³⁰ See Hall & Ziedonis, *supra* note 125, at 102 (citing WILLIAM COHEN ET AL., PROTECTING THEIR INTELLECTUAL ASSETS: APPROPRIABILITY CONDITIONS AND WHY U.S. MANUFACTURING FIRMS PATENT (OR NOT) (Nat’l Bureau of Econ. Research, Working Paper No. W7552 2000); S. Kortum & J. Lerner, *Stronger Protection or Technological Revolution: What is Behind the Recent Surge in Patenting?*, 48 CARNEGIE-ROCHESTER CONFERENCE SERIES ON PUBLIC POLICY 247 (1998)).

¹³¹ See Hall & Ziedonis, *supra* note 125, at 106 (“[E]mpirical studies have failed to find evidence that the strengthening of U.S. patent rights during the 1980s stimulated industrial spending in R&D.” (citing Kortum & Lerner, *supra* note 130, BESSEN & MASKIN, *supra* note 129)). See also Henderson et al., *supra* note 87.

¹³² See *supra* notes 86–92 and accompanying text. The rate of patenting is measured by the number of applications filed in the patent office. One way to measure indirectly the strength of research being done by an institution is to count how many times its patents are cited as prior art in the applications of other inventors. Evidence post-Bayh-Doyle showed that universities patented at a higher rate, but that their inventions were not cited in the literature with concomitantly greater frequency; e.g., patent counts did not correlate with patenting rate.

¹³³ See VERNON W. RUTTAN, TECHNOLOGY GROWTH AND DEVELOPMENT 543–45 (2001) (“Many economists have remained skeptical of the role of patents as a stimulus to invention.”); Turner, *supra* note 2, at 188 (“Scherer’s survey of ninety-one large corporations demonstrates that patent protection is the least influential factor in R&D decisions.” (citing F.M. SCHERER ET AL., PATENTS AND THE CORPORATION: A REPORT ON INDUSTRIAL TECHNOLOGY UNDER CHANGING PUBLIC POLICY (2d ed. 1959))).

¹³⁴ Edmund W. Kitch, *Property Rights in Inventions, Writings, and Marks*, 13 HARV. J.L. PUB. POL’Y. 119, 122–23 (1990) (“The claims of most issued patents are so narrow that competitors can devise many ways of achieving the same thing as the subject matter of the claim.”). Accord Edmund W. Kitch, *Elementary and Persistent Errors in the Economic Analysis of Intellectual Property*, 53 VAND. L. REV. 1727, 1729 (2000); see Merges et al., *supra* note 74, at

or appropriate the full value of their innovation.¹³⁵ Survey evidence puts it more bluntly, “R&D managers in semiconductors consistently reported that patents were among the *least* effective mechanisms for appropriating returns to R&D investments.”¹³⁶ Such reports are consistent with the opinion expressed by some economists that invention and innovation would continue in the absence of patent law due to the natural economic advantages afforded to the firm that first conceives of and exploits an idea.¹³⁷

1111 (“Patents grant the right to exclude in a tightly defined technological domain. In most cases, this does not translate into what an economist would call a “monopoly.”); *see also* Simone A. Rose, “*Monopolyphobia: A Means of Extinguishing the Fountainhead?*,” 49 CASE W. RES. L. REV. 509, 510 (1999) (“[P]atents as property rights . . . seldom confer power over price . . .”); Federal Trade Commission and Anti-Trust Division Intellectual Property Guidelines § 2.2 (1995) (“Market power is the ability profitably to maintain prices above, or output below, competitive levels for a significant period of time. The Agencies will not presume that patent, copyright, or trade secret necessarily confers market power upon its owner.”); *Nickola v. Peterson*, 580 F.2d 898, 914 n.25 (6th Cir. 1978) (concluding that a patent “rarely enjoys a dominant share in the relevant market. . . [because] ‘the patent is limited to a unique form or improvement of the product and the economic power resulting from the patent privileges is slight.’” (quoting *Northern Pac. Ry. Co. v. United States*, 356 U.S. 1, 10 n.8 (1958))).

¹³⁵ *See* Paul Geroski, *Markets for Technology: Knowledge, Innovation and Appropriability*, in HANDBOOK OF THE ECONOMICS OF INNOVATION AND TECHNOLOGICAL CHANGE 90, 103 (Paul Stoneman ed. 1995) (“most patents have very low value” (citing Mark Shankerman & Ariel Pakes, *Estimates of the Value of Patent Rights in European Countries During the Post-1950 Period*, 96 ECON. J. 1052 (1986))); Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast*, 14 BERKELEY TECH. L.J. 577, 603 (1999) (“[M]ost [patented] technologies will not be economically viable or commercially successful.”). *Cf.* F.M. SCHERER, NEW PERSPECTIVES ON ECONOMIC GROWTH AND TECHNOLOGICAL INNOVATION 58 (1999) (“[S]urveys show, most well-established business enterprises consider patents a relatively unimportant means of protecting their innovations from competitive imitation.” (citing Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 MGMT. SCI. 173 (1986))).

¹³⁶ Hall & Ziedonis, *supra* note 125, at 102 (citing Cohen et al., *supra* note 130; Levin, et al., *supra* note 101).

¹³⁷ *See* SCHERER, *supra* note 135, at 58–59.

Much more important [than patents] in the typical industry are the reputational and learning-curve advantages of being first into the marketplace with a successful new product or process, the possibility of keeping details of the technology secret from competitors, the customer loyalty that comes from providing superior sales and service, and the threat of creative destruction that forces companies to continue innovating or risk being left behind.

Id. *See also id.* at 81–88 (listing additional incentives to innovate provided by government subsidies and tax policy). “Studies of the aircraft and semiconductor industries have shown that gaining lead time and exploiting learning curve advantages are the primary methods of appropriating returns.” Levin et al., *supra* note 101, at 784, 794 (conceding that authors’ own study shows that “patents were generally rated the least effective of the mechanisms of appropriation”). *See also*, Mansfield, *supra* note 135; Cohen et al., *supra* note 130; JOSH LERNER, 150 YEARS OF PATENT PROTECTION (Harvard Bus. School, Working Paper No. 00-039, 2002).

These studies are also consistent with the doubts of Allison et al., who note that less than one percent of patents are litigated and maybe three to four percent are ever licensed.¹³⁸ They wonder whether “patent owners are simply irrational—that they are leaving gobs of money on the table” and “a giant swath of patents unaccounted for.”¹³⁹ They call the phenomenon of patenting in the absence of exploitation, “The Case of the Disappearing Patents.”¹⁴⁰ For economists, the question of why firms patent is very much alive. The litigation and licensing data does not support the simple explanation that firms patent primarily to recoup their investment in research and development, which would, indirectly at least, support the theory that firms invent in order to earn valuable patent rights.

Another reason why patent law may not stimulate R&D as directly as assumed by conventional incentive theories may be related to the difficulty in predicting ex ante the value of the exclusivity that patents confer. Denton and Heald have explored at length the process of estimating the marginal additional value of a patent to an inventor.¹⁴¹ Patent valuation depends on fixing the value of the future income stream generated by the patent right, as opposed to the value of the invention. The problems in predicting the behavior of markets over time make most valuation, even after a patented product is marketed, little more than a “guesstimate.”¹⁴² Even for those who consciously sit down and try to do the math,¹⁴³ the uncertainty inherent in calculating

¹³⁸ See ALLISON ET AL., *supra* note 126, at 3, n.14.

¹³⁹ *Id.* at 2, 3 n.14.

¹⁴⁰ *Id.* at 1.

¹⁴¹ See Russell F.R. Denton & Paul J. Heald, *Random Walks, Non-Cooperative Games, and the Complex Mathematics of Patent Pricing*, 55 RUTGERS L. REV. 1175 (2003) (setting forth a novel variation of the Black-Scholes equation as a solution to the problem of valuing patent licenses).

¹⁴² See Robert S. Bransom, *Valuing Patents, Technologies and Portfolios: Rules of Thumb*, in HANDLING INTELLECTUAL PROPERTY ISSUES IN BUSINESS TRANSACTIONS 465, 471 (PLI Intell. Prop., Handbook Series No. 635, 2001). See also Brunswick Corp. v. United. States., 36 Fed. Cl. 204, 209 (1996) (calling known forms of patent valuation “inherently unreliable”).

¹⁴³ Blair and Cotter describe the basic economic model. See Roger D. Blair & Thomas Cotter, *An Economic Analysis of Damages Rules in Intellectual Property Law*, 39 WM. & MARY L. REV. 1585 (1998); Roger D. Blair & Thomas Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L. J. 1, 45–47 (2001). It assumes the ability to calculate the net present value (NPV) of the total research effort, which is “equal to the discounted present value of the flow of future profits minus the cost of creating the idea that generates the future flow of profits.” *Id.* at 47. They conclude that “the managerial investment criterion is straightforward: if the NPV is positive, the investment should be undertaken because the discounted present value of the future profit flow exceeds the cost of creating the idea.” *Id.* In mathematical terms:

$$NPV = \sum_{t=1}^T \Pi_t / (1+r)^t - C$$

where C represents the total cost of invention, T equals the economic life of the idea, r is the discount rate, Π_t denotes the profit during period t , and Σ is the summation numerator. *Id.* at 46–47.

the value of the excluding right *before* commercialization occurs renders it nearly impossible for an R&D manager to be precisely influenced by the prospect of protection.¹⁴⁴ This may be why surveys of R&D managers suggest that patenting plays only a small role in their decisions on where to invest resources.¹⁴⁵

To summarize, trends in patenting do not necessarily correlate well with trends in research and development expenditures. Although this observation is consistent with other studies suggesting that patents seldom confer market power, economists are left with a puzzle. Why do firms patent? Clarisa Long offers a pure non-incentive theory to explain the patent paradox. She argues that patenting reduces private information costs to firms.¹⁴⁶ The patent system allows firms to “choose to obtain and use a portfolio of patent rights to signal information about themselves that would be more expensive to [convey] through other means.”¹⁴⁷ Even if a particular invention is unlikely to be either exploited within the firm or licensed, it may nonetheless be in the interest of the firm to obtain a patent to signal the strength of its research capabilities

See also Schankerman & Pakes, *supra* note 135, at 1066. Although the possibility of patenting the invention and excluding others should play a role in the calculation of the future income stream, it is likely that most managers ignore it because no available metric provides an accurate tool for making the calculation. *See* Denton & Heald, *supra* note 141, at 1176 (criticizing existing patent metrics and proposing new tool adapted from the Black-Scholes equation for valuing stock options); SCHERER, *supra* note 135, at 61–63 (discussing the variability in returns from R&D).

¹⁴⁴ That is not to say innovators are never influenced by the real possibility that the power to exclude will increase profits. Research decisions of pharmaceutical companies are almost certainly influenced by the promise of patent rights. An incentive effect may be most likely in industries, like the pharmaceutical industry, where the cost of innovation is enormous, a few firms dominate, track records of prior innovations are well-established, firms have huge portfolios of inventions to spread risks, and monopoly rewards can be substantial. *See* SCHERER, *supra* note 135, at 70 (discussing special features of pharmaceutical industry); John H. Barton, *Adapting the Intellectual Property System to New Technologies*, in GLOBAL DIMENSION OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE & TECHNOLOGY 256 (Wallerstein et al. eds. 1993) (noting pharmaceuticals constitute an exception to the normal lack of strong value); Gideon Parchomovsky & Peter Seigleman, *Toward an Integrated Theory of Intellectual Property*, 88 VA. L. REV. 1455, 1460–61 (2002) (arguing that pharmaceutical patents combine with strong trademarks to create market power and allow fuller appropriation of R&D expenditures); Alexander Tabarrok, *Patent Theory versus Patent Law*, 1 CONTRIBUTIONS TO ECON. ANAL. & POL'Y 1, 18–19 (2002) at <http://www.bepress.com/bejeap/contributions/vol1/iss1/art9> (calling chemical and pharmaceutical industries patent “outliers,” noting Mansfield, *supra* note 135, found that patent protection played a necessary role in a third or more of chemical and pharmaceutical innovations, higher than all other industries studied).

¹⁴⁵ *See* Levin et al., *supra* note 101; Mansfield, *supra* note 135.

¹⁴⁶ *See* Long, *supra* note 13, at 628 (“[P]atents can reduce information asymmetries in capital markets, thereby potentially reducing information costs.”); *id.* at 679 (“[A]ttempts to place a value on intellectual property should consider the role patents can play in mitigating informational problems in capital markets.”).

¹⁴⁷ *See id.* at 627–28.

and the value of its human capital, and to advertise its likely future market niche.¹⁴⁸ Strategic disclosure may facilitate the acquisition of venture capital or even create efficiencies in the licensing market by reducing information costs to potential business partners. Long's theory does not depend on the notion that patent law creates incentives to invent or innovate. It relies primarily on the role of patents in reducing information costs and complements the transaction costs theory presented in this paper in addressing patent paradoxes.

A firm may also patent out of fear that another firm will obtain control of technological inputs necessary to its production. Although the patent novelty rules should allay most of these fears,¹⁴⁹ so-called defensive patenting may explain some behavior by risk-averse patentees. Lemley notes that "many patentees engage in 'defensive patenting,' obtaining patents to stake their claim to an area of technology in hopes of preventing other companies from suing them. Indeed, there is anecdotal evidence that at least among high-technology and start-up companies, the primary purpose of patents is defensive."¹⁵⁰ The phenomenon of defensive patenting would

¹⁴⁸ See Hall & Ziedonis, *supra* note 125, at 104 ("Our interviews suggest that stronger patent rights are especially critical to these firms in attracting venture capital funds . . ."); John L. Turner, IV, *The Patent Renaissance* (2004) (paper on file with author) ("The non-legal value [of patents] can take many forms, such as an improved ability to attract partners and capital due to signaling of product quality, inventive productivity and/or commitment to entering a particular country's markets.").

¹⁴⁹ See 35 U.S.C. § 102(a) & (g) (2000). Only the first inventor qualifies for a patent. In addition, since a "commercial use" of an invention constitutes a "public use," the first commercial user, as opposed to the first inventor, also can object on lack of novelty grounds to the patent application of a competing inventor or user. See also 35 U.S.C. § 102(b); *Electric Storage Battery Co. v. Shimadzu*, 307 U.S. 5, 20 (1939) (holding that the ordinary use of a machine for commercial purposes is prior public use).

¹⁵⁰ Mark A. Lemley, *Intellectual Property Rights and Standard-setting Organizations*, 90 CAL. L. REV. 1889, 1949 n.249 (2002) [hereinafter Lemley, *Standard-setting*] (quoting Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1504-05 (2001) [hereinafter Lemley, *Rational Ignorance*]). See also OVE GRANDSTRAND, *THE ECONOMICS AND MANAGEMENT OF INTELLECTUAL PROPERTY: TOWARDS INTELLECTUAL CAPITALISM* 214 (1999) ("[A] motive behind patenting [is to] block the competitors from blocking oneself, and thereby ensure 'design freedom.'"); Keith M. Kupferschmid, *Prior User Rights: The Inventor's Lottery Ticket*, 21 AIPLA Q.J. 213, 228 n.56 (1993) ("Inventors often file patent applications only to prevent a subsequent inventor from obtaining a patent on the invention and shutting down their operations. This is commonly known as 'defensive patenting.'"); Lemley, *Standard-setting, supra*, at 1949 ("[P]atents are used defensively rather than offensively; their primary economic value is as a sort of trading card that reduces the risk that their owner will be held up by other patent owners."); Liza Vertinsky & Todd M. Rice, *Thinking About Thinking Machines: Implications of Machine Inventors for Patent Law*, 8 B.U. J. SCI. & TECH. L. 574, 604 (2002) ("Empirical information on uses of patents outside of litigation is lacking, but studies suggest that the number of patents that are licensed for royalties is not large, and that much of the perceived value from patents lies in defensive patenting." (citing Lemley, *Rational Ignorance, supra*, at 1503-06)); John H. Barton, *Reforming the Patent System*, 287 SCI. 1933 (2000) (proposing reform to "solve the

seem to be a negative externality in a case where the patentee has no plans to transfer its technology, no desire to signal markets, and no hope of obtaining market power. In such a case, the patent system may sometimes impose a cost that is consistent with the empirical data discussed above, although not necessarily a significant cost. If this cost were large enough, it would diminish the force of the transaction costs justification for patent law. Clearly, more documentation of the defensive patenting phenomenon is desirable, as would be legal reform to reduce its prevalence.¹⁵¹

Conclusion. As a descriptive matter, incentive theories do a poor job of explaining important aspects of patentee behavior. An emphasis instead on the relationship between patenting and transaction costs provides a better explanation for the flourishing of the patent form. Because patents effectively partition information assets, signal important information to markets, and reduce the cost of monitoring team production, the patent form will be used regardless of its ability to guarantee the appropriation of expenditures on research and development. Dreams of market power play no essential role. The transaction costs theory best illuminates Hall and Ziedonis's findings that "the strengthening of U.S patent rights has indeed altered the incentives of firms to patent, but for reasons that transcend those implied by a narrow conception of patents as a mechanism by which to appropriate returns to R&D."¹⁵²

The story of patent law and patenting behavior is complex and multi-faceted; it must be admitted, to the extent that the patent system makes some information assets more valuable, we might expect *some* increase in R&D expenditures to create them, but probably not at a first order of magnitude. Otherwise, we would see a much tighter correlation between patenting behavior and expenditures to produce patentable assets. It is most plausible to imagine a complex story: A regime of trade secrecy entails significant transaction costs and is inadequate to render information assets as valuable and usable as tangible assets. The patent title recordation system solves these problems and facilitates the revelation of information about patentees. Like any other property rule that secures exclusive rights, some rent-seeking will be generated, and on some occasions, market power conferred.

Viewing patent law in this light, we need not be disturbed when we see periods where the rate of patenting correlates poorly with the rate of research and development expenditures. It is plausible that patenting increased after 1982 because

problem of defensive patent portfolios"); Scott Herhold, *Patent War Pending: Once-Arcane Field Emerges as Battleground Between Online Start-ups and Established Companies*, SAN JOSE MERCURY NEWS, July 18, 1999, at 1E (quoting a venture capitalist as saying "None of my companies seek patent protection because they actually think it will protect them from competition Rather, they seek patents to protect themselves from other people who have patents.").

¹⁵¹ Several commentators have advocated a strong prior user's right, as is available in Europe, that would prevent newly issued patents from interfering with ongoing uses of the patented technology. See MERGES ET AL., *supra* note 74, at 171-72.

¹⁵² See Hall & Ziedonis, *supra* note 125, at 118.

the patent system became more reliable, and therefore more likely to confer the benefits and cost reductions identified above. Hall and Ziedonis report that firms "harvest[ed]" more of their latent inventions in the 1980's and "ramp[ed] up" their patent filings.¹⁵³ One of their interviewees even noted that there were "'a lot of patentable inventions sitting around.'"¹⁵⁴ Any title system that becomes twice as reliable and predictable should see a heavy increase in usage. This does not necessarily require, however, a concomitant increase in the production of the underlying object, inventions, protected by the title system, although it might happen under certain circumstances.¹⁵⁵

IV. A NORMATIVE CONCLUSION

The traditional normative defense of patent law asserts that the public benefits of increased inventiveness, innovation, and disclosure of information offset the monopoly costs imposed by holders of exclusive rights.¹⁵⁶ The economic data discussed above has caused the most influential commentators in the field to question both the power of patent law incentives, on the one hand, and the size of the monopoly losses that the public suffers, on the other. The traditional normative justification needs a complementary theory.

In a 1976 article, Kitch argued that the patent system might be partially justified on grounds apart from the incentive-to-invent story.¹⁵⁷ First, analogizing the patent registration system to the federal mineral claim system, he asserted that the public notice, "the claim," provided by the early grant of a patent¹⁵⁸ reduces the cost of wasteful investments in duplicative research and development among competing firms.¹⁵⁹ Second, he suggested that the patent recordation system reduces the cost to innovators of identifying and obtaining necessary complementary technology.¹⁶⁰ Third, he noted that by eliminating the need for secrecy, "a patent system reduces the

¹⁵³ *Id.* at 122.

¹⁵⁴ *Id.* at 109.

¹⁵⁵ Again, pharmaceuticals are probably the major special circumstance. *See supra* note 142.

¹⁵⁶ *See supra* notes 1-3.

¹⁵⁷ *See Kitch, supra* note 17, at 276.

¹⁵⁸ A working prototype of an invention need not exist in order for a patent to issue. *See* 35 U.S.C. §§ 102(g) & 112 (2000).

¹⁵⁹ *See Kitch, supra* note 17, at 276 (noting that recordation "puts the patent owner in a position to coordinate the search for technological and market enhancement of the patent's value so that duplicative investments are not made and so that information is exchanged among the searchers").

¹⁶⁰ *Id.* at 277-78 ("[A] patent system lowers the cost for the owner of technological information of contracting with other firms possessing complementary information and resources. . . . [Negotiating for secrets is difficult and the] patent creates a defined set of legal rights known to both parties at the outset of negotiations.").

cost of maintaining control over technology.”¹⁶¹ His prospect theory of patent law provided a partial normative justification for the patent system based on the reduction of certain public costs. In addition, Clarisa Long’s work suggests that patent law saves other public costs by facilitating the disclosure of information to markets.¹⁶² Although traditional disclosure theories emphasize the economic value of secrets revealed in patent applications, she argues that information revealed about the patentee *firm* may be just as valuable to the market.¹⁶³ To the extent that the cost of persuasively communicating valuable information to capital markets is lowered through the patent system, patent law clearly has another identifiable economizing function.

The role of patents in effecting affirmative asset partitioning and addressing team-production-monitoring problems suggests two additional important economizing functions. The patent system lowers the cost of transferring information assets by establishing a recordation system that enables transferees to take title free from the claims of creditors and heirs of the transferor.¹⁶⁴ More importantly, patents lower the cost of monitoring the team production of information assets. Patent rules deter opportunistic behavior at a lower cost than trade secrecy and facilitate the creation of mediating hierarchies that can efficiently address issues of both opportunism and compensation.¹⁶⁵ Like the contributions noted by Kitch and Long, the reduction of private costs identified in this article translate easily into public benefits. The aggregate savings identified in the transaction costs theory of patent law may well be significant enough to justify the creation and maintenance of a patent system even if the traditionally identified costs (occasional monopoly effects) and traditional benefits (invention, commercialization, and disclosure) merely balance themselves out. It is certainly a useful justification in a world where economists themselves remain agnostic about the overall welfare effects of the patent system.

Finally, since the savings identified in this essay are likely to be significant, they are worth accounting for in the debates which have been raging over reforming the patent system.¹⁶⁶ One focus of those debates is the reliability of the Patent Office.¹⁶⁷

¹⁶¹ *Id.* at 279.

¹⁶² See *supra* notes 13–14, 26–27, and accompanying text.

¹⁶³ *Id.*

¹⁶⁴ See *supra* notes 36–54 and accompanying text.

¹⁶⁵ See *supra* notes 70–121 and accompanying text.

¹⁶⁶ See generally Symposium, *Patent System Reform*, 17 BERKELEY TECH. L.J. 727 (2002).

¹⁶⁷ See, e.g., Jay P. Kesan, *Carrots and Sticks to Create a Better Patent System*, 17 BERKELEY TECH. L.J. 763, 797 (2002) (“It is widely recognized that the Patent Office grants overly broad patents since it has deficient knowledge of the relevant prior art.”); see generally Mark D. Janis, *Rethinking Reexamination: Toward a Viable Administrative Revocation System for U.S. Patent Law*, 11 HARV. J.L. & TECH. 1 (1997) (suggesting improved patent office proceedings would be better than resolving disputes over validity in court). See also *Patent Reform and the Patent and Trademark Office Reauthorization for Fiscal Year 2000 Before the Subcomm. on Courts and Intellectual Prop. of the House Comm. on the Judiciary*, 106th Cong. 88 (1999).

The Patent Office has been accused of issuing numerous suspect patents, prompting calls to tighten scrutiny by patent examiners.¹⁶⁸ These calls have been resisted by some who suggest that the federal courts are a more efficient place for making primary determinations of patent validity.¹⁶⁹ One lesson from post-1982 empirical studies is that patenting behavior is very sensitive to the perceived enforceability of issued patents. If patent validity rates start to go down, then we should also see a drop in patent applications. The less reliable a title registration system is, the less it will be used. To the extent that the system makes possible significant cost savings over its alternative—trade secrecy—then calls for reform should consider fine tuning from the transactional perspective.¹⁷⁰

For example, F. Scott Kieff has suggested the adoption of a “soft-look” registration system that would include rule changes to encourage better drafting by patentees.¹⁷¹ Jay Kesan, on the other hand, has advocated tougher scrutiny of patent applications by the Patent Office.¹⁷² Tim Muris, Chairman of the Federal Trade Commission, has endorsed widening the availability of third party challenges to patent applications.¹⁷³ Kieff’s proposal is probably most sensitive to maintaining the

(statement of Ronald J. Stern, President, Patent Office Prof’l Ass’n) (“Patent examination needs to be enhanced by providing more time for examination.”). The Commissioner of the PTO suggested as early as 1994 that “[w]e are going to have to re-engineer the Patent and Trademark Office so that we give [examiners] more time and more resources. That has a price tag.” George Leopold, *Congress, PTO Ponder Ways to Streamline Operation*, ELECTRONIC ENGINEERING TIMES, Aug. 1, 1994, at 1.

¹⁶⁸ See generally Merges, *supra* note 135 (arguing for new procedures, such as a patent opposition system, and a reform of the way patents are examined); John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 305, 316–22 (stating that insufficient prior art samples has led to issuance of too many invalid patents); Lawrence Lessig, *The Problem with Patents*, THE STANDARD, Apr. 23, 1999, at <http://www.lessig.org/content/standard/0,1902,4296,00.html> (asserting that workloads and incentives at the U.S. Patent and Trademark Office are a significant contributor to the increase in issuance of “bad patents”).

¹⁶⁹ See generally Mark Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495 (2001) (arguing that reliance on the federal judiciary as the primary check on bad patents is less costly than improving the examination procedure in the Patent Office). *Contra* Craig Allen Nard, *Legitimacy and the Useful Arts*, 10 HARV. J.L. & TECH. 515, 557 (1997) (suggesting that the PTO is better suited to resolve patent validity issues than a judge or lay jury).

¹⁷⁰ See Kesan, *supra* note 167, at 797 (suggesting strategies to “put in place incentives and mechanisms to create a better-informed Patent Office that is more likely to grant patents commensurate with innovation”).

¹⁷¹ See F. Scott Kieff, *THE CASE FOR REGISTERING PATENTS AND THE LAW AND ECONOMICS OF PRESENT PATENT-OBTAINING RULES* (The Harvard John M. Olin Discussion Paper Series, Discussion Paper No. 415, 2003).

¹⁷² Kesan, *supra* note 167.

¹⁷³ See *FTC Recommends Changes to Patent Laws to Ease Path to Overturning Invalid Patents*, 72 U.S.L.W. 2251 (2003).

transactions-costs savings present in the current system. By ratcheting up scrutiny in the Patent Office itself, the reforms of Muris and Kesan would raise the cost of prosecuting a patent and might perhaps chill the use of the system. Making registration easier under Kieff's soft-look approach would invite more applications, some of them undoubtedly bogus, but he seeks to provide incentives for improper applicants to weed themselves out. Any of these suggestions is probably superior to approaches that would result in increased judicial invalidation of registered patents and its attendant uncertainty.

Regardless of the merits of any particular reform proposal, the focus of the debate should be shifted away from arguments about whether current patent office procedure encourages or discourages invention and innovation. Policymakers should consider reforming the patent title registration system in the same terms as they might consider reforming an automobile title registration system. The focus should be on the cheap, useful, and clear delineation of property rights. From time to time, automobile title systems have been reformed to become more useful to those who want to transfer rights to vehicles,¹⁷⁴ but no one, rightly, ever thinks it relevant to spend too much time deciding whether those reforms will encourage or discourage invention and innovation in the auto industry.

¹⁷⁴ See, e.g., Uniform Motor Vehicle Certificate of Title and Anti-Theft Act (NUCUSL 1955).

